

October 15, 2018

Memo-
Case No. 17CW3258 Response to SOC



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To:
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Project name:
Snowmass Water and Sanitation District
Water Rights

From:
Chris Romeyn, PE, CFM
John Sikora, PE

Date:
October 15, 2018

Memo

Subject: Case No. 17CW3258 Response to SOC

Response to Division Engineer Concerns

1. Applicant must revise the map provided with the application to include the point(s) of return flows from the SWSD wastewater treatment plant and an identification of the reach of stream where the Brush Creek Metro District ISDS returns accrue.

Response:

The Location of the SWSD wastewater treatment plan outfall has been identified on the updated map attached. The reach of Brush Creek where Brush Creek Metro District (BCMD) ISDS returns accrue is also identified. All of the BCMD ISDS are located within the Brush Creek watershed and their return flows accrue to the reach of Brush Creek shown on the attached map.

2. The application defines domestic consumption within SWSD as the difference between a measurement at the water treatment plant and a measurement at the wastewater treatment outfall. Applicant must provide additional evidence and further explanation of how this methodology will be applied in practice. The evidence must include an analysis of the District's sewer collection system and wastewater treatment plant operations to ensure that the system does not intercept groundwater or any other sources of inflows. A further explanation of the accounting methodology must explain in detail how this methodology will be utilized when the District is diverting from multiple locations under multiple water rights at the same time the diversion from the SWSD RFIP is being augmented.

Response:

System Overview

Currently the SWSD has three physical sources of water: Snowmass Creek, East Snowmass Creek, and West Fork Brush Creek, located in two adjacent watersheds. In addition, SWSD inadvertently captures runoff into the sanitary system in the spring. This water is measured indirectly.

Due to agreements and decree limitations the maximum combined diversion rate for these three diversions is 11.9 cfs (6.0+5.1+0.77, respectively). The proposed Roaring Fork Intake Pipeline (RFIP) will provide a critical fourth supply source from a third watershed which will increase the resiliency of the SWSD supply system. The RFIP is being developed as an emergency water supply for use in case the District's primary water sources are compromised due to wildfire, drought, or other emergency. The proposed RFIP diversion rate is 9.0 cfs and will be used to supply existing and planned development within the District Boundary. The

District operates all available water rights within the limits of the respective decrees (including diversion rates, and consumptive use limitations) on a senior's first basis.

Figure 1 presents a schematic of the SWSD system for water rights accounting purposes. The SWSD has a SCADA system that records flows at numerous locations within its system. The locations where SCADA flow recording devices are located are indicated by the small circular symbols. Locations where flows (e.g. irrigation return flow, reservoir evaporation, etc.) are calculated are indicated by bold red arrows. These values are calculated using a water balance. The proposed RFIP is also identified.

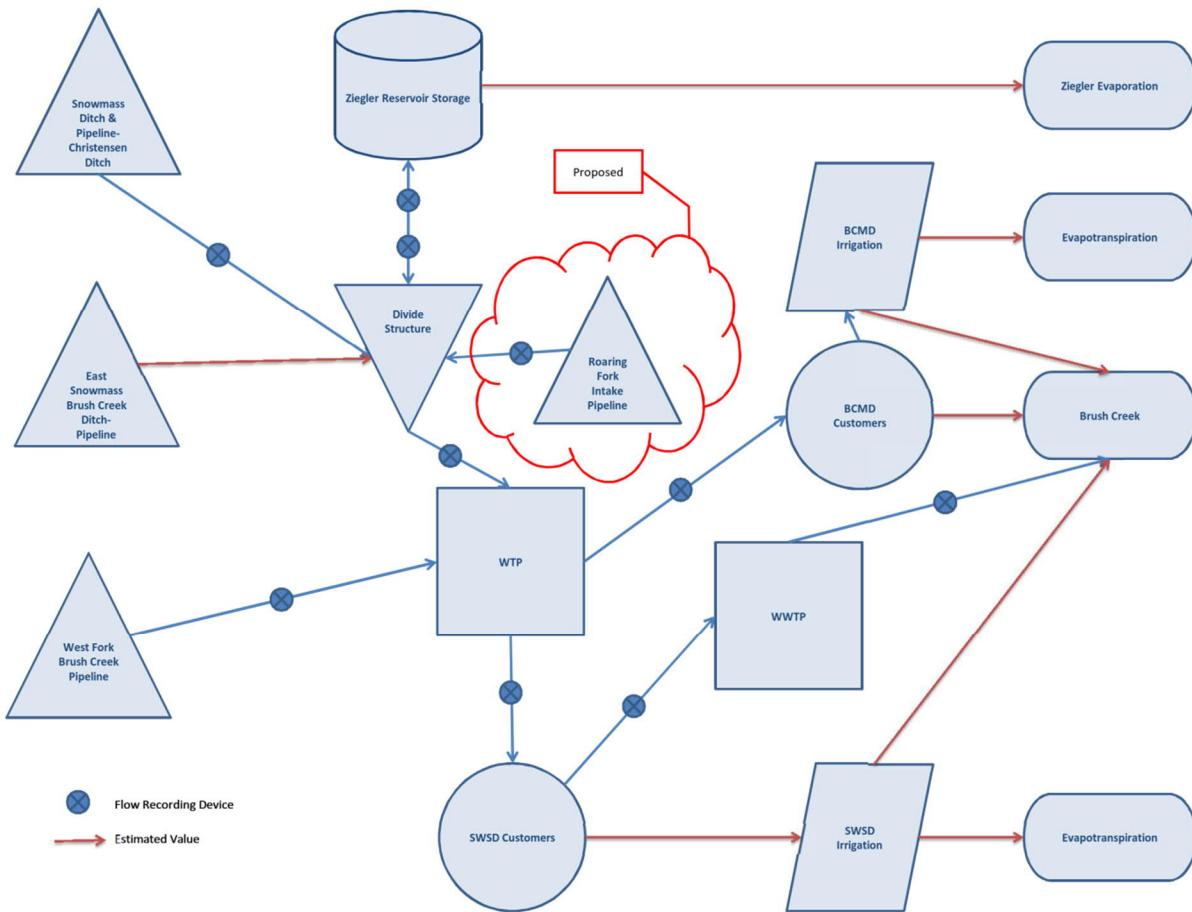


Figure 1 Snowmass Water and Sanitation District System Schematic

Overall Accounting Approach

The addition of the RFIP will not change the operation of the SWSD storage, distribution or collection system, as it simply adds a new source. The RFIP will be capable of delivering water to either the treatment facility or Ziegler Reservoir and deliveries to each will be recorded and incorporated into the current water rights accounting system. The following provides a brief summary of the accounting approach:

- Diversions: All diversions are tracked and recorded.
- Ziegler Reservoir: A water balance is performed on Ziegler Reservoir based on inflow, outflow, and the change in stage-storage. Evaporation is calculated based on methods outlined in SB-120. The calculated evaporation is added to any deficit from the water balance.
- WWTP Return Flows: see following discussion of WWTP flow and I&I.
- Irrigation diversion and return flows: see following discussion on irrigation in #3 below.
- Brush Creek Metro: All deliveries to Brush Creek Metro are metered and recorded. The percentage of the water supply used for irrigation is assumed to be the same as SWSD.
- Irrigation and Brush Creek Metro ISDS return flows are delayed based on Glover Analysis.

- Consumptive use is calculated as diversions minus (-) return flows.
- Return flows and the resulting consumptive use amount is divided between the diversion points (and associated water rights) on a percentage basis based on diversions. For example, if 50% of the flow for the day is diverted from the Snowmass Creek basin diversion and 50% is diverted from the RFIP, then 50% of the return flow and associated consumptive use is assigned to the RFIP.

Wastewater Flow & Infiltration

There are three general sources of water flowing into the SWSD WWTP: wastewater from District customers, wastewater from Aspen Skiing Company (ASC), and Inflow & Infiltration (I&I). The ASC contribution is very small, likely less than 1% of annual WWTP flow. The ASC wastewater inflow is accounted for separately and not included in the SWSD return flows.

The sources of I&I include groundwater seepage, snowmelt, and storm water runoff. The District has no ability to track these three sources of I&I on an instantaneous or even daily basis. However, the District does compare WWTP outflow to Water Treatment Plant potable production on a monthly basis to understand the total monthly volume of I&I. The 2013-2017 historic record shows that infiltration into the sewer collection system has occurred in the months of March, April and May (Figure 2). The majority of I&I in the District comes from snowmelt within the Brush Creek drainage. The June through February consumptive use values are within the expected seasonal range for municipal systems in Colorado. In contrast the negative values in the months of March, April and May suggest significant infiltration ranging from 8% to 74% of WTP production.

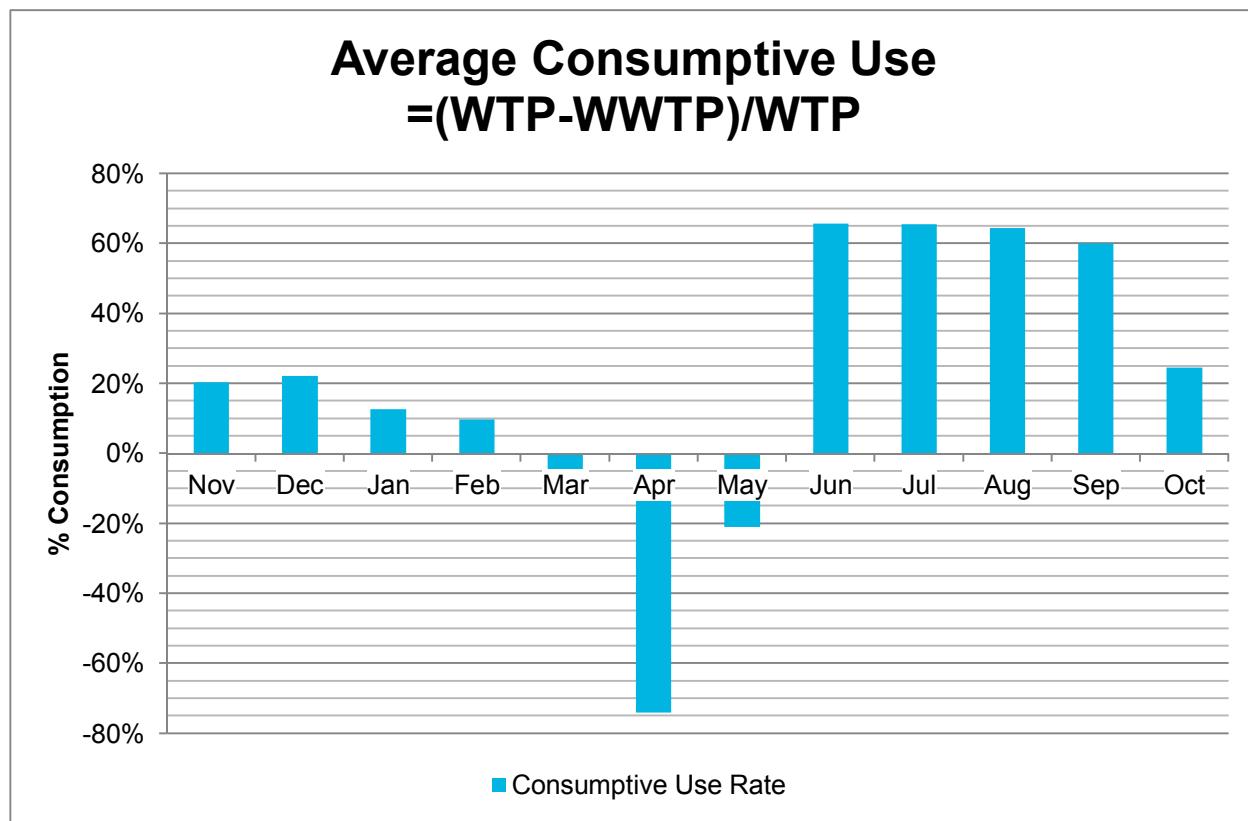


Figure 2 % Consumptive Use Potable Water

Domestic Consumption Accounting

The I&I identified above results in increased WWTP outflow. This increase cannot be considered return flow for the District's water rights accounting; it is native to the Brush Creek Drainage. SWSD submits water rights accounting spreadsheets to the Division Engineer each month and at the end of every water year. The accounting spreadsheets use the following procedure to properly account for return flows during periods when WWTP flow exceeds 95% of WTP production:

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1. SWSD WTP production (Q_{WTP}) is compared to SWSD WWTP flow (Q_{WWTP}).
2. If $Q_{WWTP} > 0.95 \times Q_{WTP}$ then I&I is occurring.
3. When I&I is occurring the actual Q_{WWTP} is estimated using $0.95 \times Q_{WTP}$.
4. If $Q_{WWTP} \leq 0.95 \times Q_{WTP}$ then I&I is not occurring and the entire Q_{WWTP} is considered return flow.

In months where there is no I&I (e.g. $Q_{WWTP} \leq 0.95 \times Q_{WTP}$) the volume of domestic consumption is calculated as the difference between Q_{WWTP} and Q_{WTP} (e.g. Domestic CU = $Q_{WTP} - Q_{WWTP}$). In months where there is I&I (e.g. $Q_{WWTP} > 0.95 \times Q_{WTP}$) the volume of domestic consumption is calculated as 5% of Q_{WTP} (e.g. Domestic CU = $0.05 \times Q_{WTP}$).

3. The application states that "Water used in either area for outdoor irrigation shall be assumed to be 80% consumptive." The applicant must provide the accounting mechanism that will be utilized to determine the amount of diversions that are to be attributed to irrigation.

Response:

Irrigation Accounting

Irrigation demands occur in the months of May through October; there is no irrigation demand November through April. Irrigation diversions and return flows are accounted for using the following procedure:

- In irrigation months where $Q_{WWTP} \leq 0.95 \times Q_{WTP}$ indoor potable (non-irrigation) use is estimated assuming a 5% consumptive use rate: $Q_{WTP-NON-IRRIGATION} = Q_{WWTP}/0.95$.
- Irrigation use is then calculated using $Q_{WTP-IRRIGATION} = Q_{WTP} - Q_{WTP-NON-IRRIGATION}$.
- In irrigation months where $Q_{WWTP} > 0.95 \times Q_{WTP}$ the Q_{WWTP} cannot be used to estimate indoor potable (non-irrigation) use. Q_{WTP} for those months (typically May) is estimated as the average Q_{WTP} from the previous November and April (months without irrigation and low tourist occupancy).
- Irrigation is assumed to be 80% efficient.
- Return flows are delayed according to the results of a Glover Analysis.

Figure 1 Location Map



**Snowmass Water
and
Sanitation District**

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Legend

- ▲ Approximate SWSD WWTP Outfall
- BCMD Return Reach
- Roaring Fork Exchange Reach
- Snowmass Creek/Roaring Fork Exchange Reach
- Brush Creek Metropolitan District
- SWSD District Boundary
- Boundary

Note 1: Water provided to Brush Creek Metropolitan District per March 8, 1994 Agreement.
Note 2: Location for East Snowmass Brush Creek Ditch and Pipeline Provided by SGM

